USAID
FROM THE AMERICAN PEOPLE

Integrated Initiatives for Economic Growth in Mali (IICEM)

Final Report

ITIATIVES INTÉGRÉES POUR LA CROISSANCE ECONOMIQUE AU MALI (IICEM) IQC# EDH-I-13-05-00005

FOR THE REPORTING PERIOD: JANUARY 2010 – FEBRUARY 2014

Above: Afu Traore, member of the Benkadi Women's Cooperative supported by IICEM in M'Pegnesso, Mali, making parboiled rice, a high-value commodity that increases family revenues

"*We used to become fatigued to the point where we couldn't do anything else. Now with this new equipment, we don't have to spend our days hulling rice by hand.*"

February 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by Abt Associates, Inc.

TABLE OF CONTENTS

ACRONYMS

AIID	*Association des Intervenants Inter Disciplinaires pour le Développement*
APCAM	Assemblée Permanente des Chambres d'Agriculture du Mali
AOPP	Association of Professional Peasant Organizations
AMPROD	*Association Malienne pour la Protection et le Développement de l'Environnement au Sahel*
APROFEM	Association for the Advancement of Women and Children in Mali
AVRDC	Asian Vegetable Research Development Center
BDS	Business Development Services
BEACIL	*Bureau d'Etudes et d'Appui Conseil Aux Initiatives Locales*
BNDA	*Banque Nationale de Développement Agricole*
CAPAM	*Coopérative Agro-Pastorale de Mandela*
CECAM	Center for Conciliation and Arbitration of Mali
CMDT	*Compagnie Malienne de Distribution de Textile*
CNOP	National Coordination of Farming Organizations
GDCM	Major cereal distributor of Mali
GMM	*Grands Moulins du Mali*
GREFA	*Groupe de Recherche, d'Etude, de Formation en Agriculture*
ha	Hectare (equivalent to 2.47 acres)
HIMO	*Haute Intensité de Main d'Œuvre* (Manual Labor-Intensive)
INTSORMIL	CRSP International Sorghum and Millet Collaborative Research Support Program
IVP	Irrigated Village Perimeter
km	Kilometer
M	Million (units)
m	Meter
MDS	*Moulins du Sahel*
MT	Metric Ton
NGO	Non-Governmental Organization
PO	Producer Organization
SAF	*Fonds d'Activités Stratégiques* (Strategic Activity Fund)
SWOT	Strengths, Weaknesses, Opportunities, Threats (Analysis)
UEMOA	West African Economic and Monetary Union
USCPMD	Union of Maize Producer Cooperatives of Diedougou

EXECUTIVE SUMMARY

IICEM's market-driven approach helped over 36,000 farmers realize greater crop yields, sell in a more structured market and leverage contractual agreements to obtain first-time bank financing.

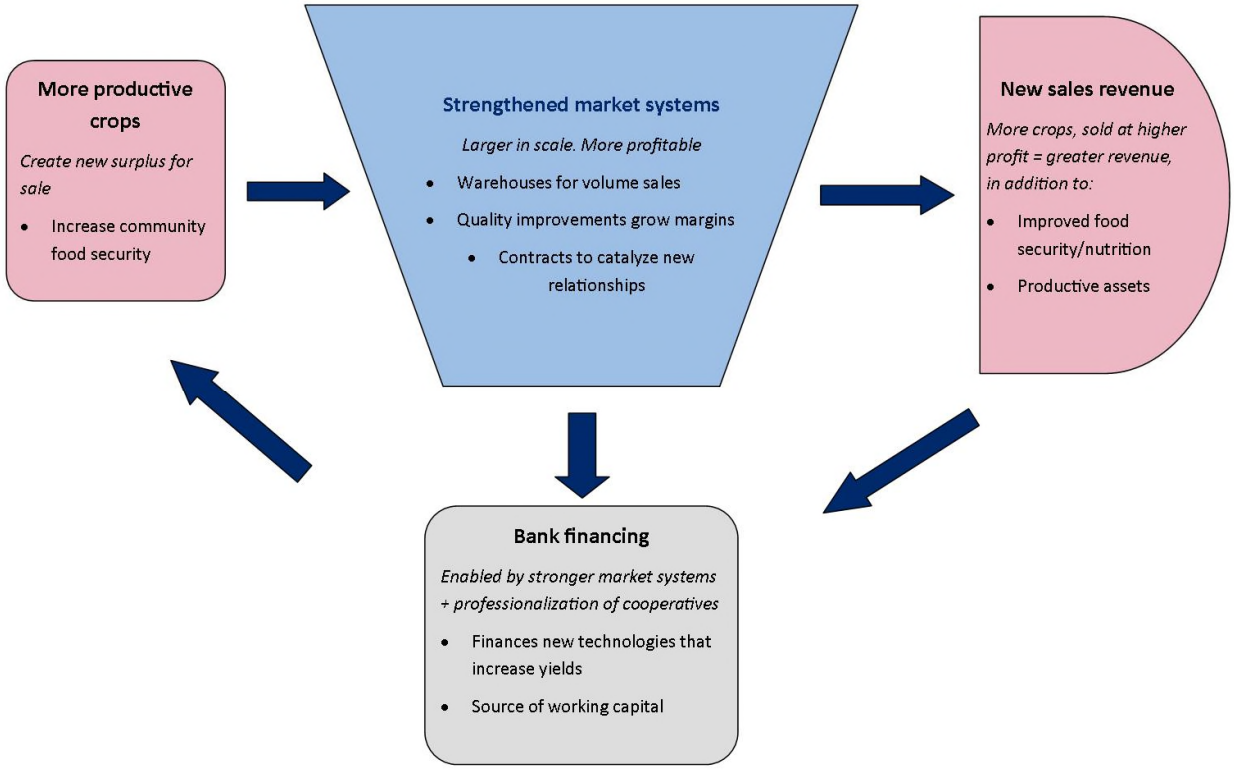
From 2010-2013, the Integrated Initiatives for Economic Growth in Mali (IICEM) project was USAID/Mali's cornerstone economic growth program under the U.S. Government's Feed the Future (FTF) initiative. The project stimulated economic expansion that boosted rural revenues, while improving food security through better production, stronger commercial markets for basic food security crops (millet, sorghum and rice), and access to financial services.

The second implementation phase of IICEM, which started in January of 2010, was marked by a number of challenges, including poor harvests in 2011 due to a regional drought. Mali's national security also gradually deteriorated, with periods of national crisis that peaked with the March 2012 *coup d'état* and the occupation of northern areas of the country by separatist rebels starting in April 2012. This instability affected the project and its beneficiaries: Major banking services closed in the north, and the U.S. government imposed a ban on working with the interim government of Mali until formal elections could be held. Security gradually improved following interventions by French and United Nations forces, a relatively smooth election, and installation of a new president, which enabled the project to collaborate with the Malian government again by September 2013. IICEM consistently assessed these shifts and adapted its strategy accordingly. Despite the numerous challenges of the past three years, the project met its targets—and in some cases, significantly exceeded them.

IICEM's signature, market-driven approach bolstered the capacity of and relations between value chain actors, driving demand through more structured trade and facilitating access to bank loans. Operationally, the project accomplished an extensive realignment with the Feed the Future strategy, which included:

- Intensified focus on the key cereals sectors of millet/sorghum and rice.
- Gradual phase-out of activities related to potato, tomato, shallot, mango and tiger nut sectors by August 2011.
- Addition of environmental resilience strategies and expanded gender inclusion efforts.
- Reduction of operating regions from seven to three (Sikasso, Mopti, and Timbuktu).

A Market-Based Approach



Key Impacts

INDICATORS (YR 4 results or cumulative when possible)	Baseline	FY13 Results	% Growth
Gross margin per unit ($/ha)			
Millet	$122	$363	+197
Sorghum	$122	$266	+118
Lowland Rice (Sikasso)	$259	$786	+203
Irrigated Rice (PIV)	$1,050	$1,215	+15
*Value of **incremental** farm-gate sales YR 4*	$602,000	**$6,000,000**	+907
Millet		$3,500,000	
Sorghum		$2,200,000	
Lowland Rice (Sikasso)		$200,000	
Irrigated Rice (PIV)		$100,000	
*Volume of **incremental** farm-gate sales YR4*		**3,818 MT**	
Millet		442 MT	
Sorghum		39 MT	
Lowland Rice (Sikasso)		1,133 MT	
Irrigated Rice (PIV)		2,204 MT	
Value of farm-gate sales	$1,347,000	**$13,910,000**	+933
Millet	-	$2,100,000	
Sorghum	-	$1,210,000	
Lowland Rice (Sikasso)	$667,000	$6,600,000	
Irrigated Rice (PIV)	$680,000	$4,000,000	
Volume of farm-gate sales	4,369 MT	**37,569 MT**	+760
Millet	-	6,342 MT	
Sorghum	-	5,467 MT	
Lowland Rice (Sikasso)	2,028 MT	14,016 MT	
Irrigated Rice (PIV)	2,341 MT	11,782 MT	
FtF value chain cultivation, in ha (millet, sorghum, rice)	5,024	**47,962**	+854
Millet	-	16,682	
Sorghum	-	19,263	
Lowland Rice (Sikasso)	1,278	3,548	
North Irrigated Rice (PIV) and Lowland Rice	3,746	8,469	
Number of farmers and others who have applied new technologies or management practices due to IICEM	2,778	29,805	+972
Number of new technologies/management practices available for transfer	12	32	+166
Cumulative number of persons trained	3,387	22,168	+554
Number of micro, small and medium-sized enterprises receiving IICEM support for access to bank loans	-	3,382	-
Total farmers assisted by IICEM	7,523	36,463	+384
Total producer organizations assisted by IICEM	80	574	+617
Value of agricultural and rural loans	$956,000	$6,800,000	+611
Number of agricultural and rural loans (cooperatives mostly)	164	500	+205

Number of policies, laws, agreements or regulations in these categories:			
Phase I of 5: Analysis	-	5	
Phase 2 of 5: Elaborated and presented for public discussion	-	3	
Phase 3 of 5: Presented for new legislation of decrees	-	2	
Phase 4 of 5: Approved and passed	-	1	
Phase 5 of 5: For implementation	-	-	

Cooperative members in Dire, Timbuktu heading to their rice fields, shortly after an IICEM distribution of fertilizer and seeds. With banks still closed one year after the April 2012 *coup d'état*, the project pivoted to provide an emergency food security intervention, to secure harvests and community food security.

1. Increased Production and Improved Productivity

New irrigation infrastructure and cultivation technology comprising improved seed and fertilizer boosted crop yields by:

***101%** for millet/sorghum*
***85%** for lowland rice in Sikasso region*
***40%** for Irrigated Village Perimeter (IVP) rice in the Mopti region*

Improved food security and greater revenues for farmers starts on the farm. Over the course of the project, IICEM's interventions dramatically augmented productivity for partner farmers, primarily through intensified cultivation and greater yields. When combined with IICEM's market access strategy, the potential of these new crops translates directly into new revenues and increased food security for Feed the Future communities. IICEM helped farmers from the millet/sorghum and rice value chains realize these gains in crop production by first providing new or rehabilitated irrigation infrastructure like Irrigated Village Perimeters (IVPs) in the Mopti region and small irrigation dams in the Sikasso region. The project followed this with a new agricultural technology package that included improved seeds, fertilizer micro-dosing and training in agricultural best practices.

Overall, IICEM financing for infrastructure—including dams, warehouses, and small cereal mills— and technical training on improved productivity and product quality enabled producers, processors, and consolidators to increase their margins and improve productivity on multiple fronts. This new infrastructure raised the available cultivation potential for farmers, adding 3,545 hectares (8,759 acres) of new or improved irrigated crops through the construction of 48 irrigation canals and 29 small dams. Over the life of the project IICEM rehabilitated over 47,000 linear meters of irrigation canal. Coupled with the comprehensive technology package, this infrastructure escalated yields over the course of the project, providing community food security and—often for the first time—a crop surplus, opening up new market opportunities.

2. Access to Markets and Improved Commercialization

IICEM grew the number of supported farming cooperatives from 80 to 500 and helped partners' sales surge from a total of $602,000 to $6,067,792

IICEM leveraged the commercial impetus of surplus crops by laying the foundation for a more structured, higher-capacity market system anchored by sales contracts to formalize relationships between players. This strategy looked beyond local markets to link demand with surpluses from partner producer organizations that—thanks to IICEM's training and technical assistance—were increasingly better organized and focused on quality improvements. These improvements reduced post-harvest losses through better processing and storage, further boosting marketable quantities. Improved quality also reduced transaction costs through more efficient logistical management, helping producers strategically position in target markets. Consequently, IICEM partner producers have seen higher sales volumes and profit margins.

The application of IICEM's market strategy significantly changed how many farmers went about their business. Sales are now progressively routed through formal contracts—a first for many partner farmers—that encourage greater volumes and higher-quality products, so farmers see their newfound crop surpluses translate directly into more revenue.

The numbers tell the story: IICEM's beneficiary network realized 490% growth in total cultivated area, mainly through the addition of new producer organizations and lands with new irrigation infrastructure. However, the jump in sales was even larger—907% percent during the same timeframe, a considerable boost to farmers' individual revenues. In 2013, IICEM partners sold 19,000 metric tons of millet, sorghum and rice valued at more than $6 million. More than half of these sales came via 222 formal sales

contracts, which helped cooperatives streamline their revenue—and demonstrated a predictable income stream for bank financing.

3. Improved Access to Financial Services

IICEM facilitated 513 loans for $6.6 million and leveraged more than $9.5 million in private investment in target value chains through the project's strategic investment funds and business development services.

In 2013, more than 3,300 farmers were financed by banks, one-fourth of them women.

ICEM's market-driven strategy helped key value chain players gain access financial services, particularly bank loans. More structured, predictable cereal purchases made banks more confident and willing to lend to producers. Access to bank financing was essential for farmers to purchase inputs, either on the market or through IICEM's comprehensive technology package, which required working capital to buy fertilizers and improved seeds.

Banks' reluctance to lend to the agricultural sector in Mali is usually directly tied to farming cooperatives' inability to accurately estimate their financial needs or manage cash flow sufficiently to guarantee reliable loan payments. IICEM-supported farmers were only financed by banks after making significant leaps in their technical and business capacity—and after IICEM educated branch managers of Mali's leading agricultural bank, the BNDA, about these new lending opportunities. To reduce bank's initial risk exposure, IICEM set up a loan guarantee fund for new lending markets, offering a partial guarantee for first-time loan recipients. In areas where banking institutions were shuttered by Mali's political crisis, IICEM led interventions to provide agricultural inputs and kick-start working capital savings for future planting—and future loans, once banks reopened.

Results: In 2013, 3,382 farmers received bank loans—and more than 100 loans were granted to millet/sorghum farming cooperatives without the backing of IICEM's loan guarantee fund. These cooperatives had never been financed at this scale in Mali. With the ability to finance inputs, farmers are able to deploy IICEM's new technologies, raise their yields and respond to increased demand from newly-strengthened market systems.

1. INCREASED PRODUCTION AND IMPROVED PRODUCTIVITY

Above: Cooperative members prime a new irrigation pump, one of 36 provided to partner cooperatives, to increase irrigation and productivity in Irrigated Village Perimeters in Mali's Mopti region.

Stronger millet/sorghum and rice value chains start at the farm level—with more production underlying efforts to strengthen Mali's cereal markets and their key players. IICEM boosted crop yields and quality of rice, millet, and sorghum through better irrigation infrastructure, productivity training and the promotion of a comprehensive farming technology package. These on-farm improvements enabled IICEM-supported farmers and their families to generate more revenue, eat healthier and acquire assets, while key Feed the Future communities expanded their production potential.

Improved irrigation infrastructure

With a matching community contribution, IICEM built small dams and irrigation canals, an important first step to help farmers reduce fixed costs and improve crop yields.

IICEM's approach to irrigation/water resources development began with a consultative site selection process that evaluated community commitment, followed by technical feasibility, economic returns, and financial, social and environmental concerns. A protocol between each community and the project outlined matching community contributions and the establishment of committees to oversee construction, operations and ongoing maintenance.

For rice growers in the arid Mopti region, IICEM rehabilitated cement irrigation canals or Irrigated Village Perimeters (IVPs) that ensure more effective water usage and reduce pumping and production costs by up to 50%. With better irrigation, rice farmers can grow more in the same area, helping them realize higher profit margins that benefit households and entire communities. These irrigation improvements can ultimately increase yields to 5-8 tons per hectare from 3-4 tons per hectare without. Construction was completed through local high-intensity labor teams (HIMO), which rehabilitated and extended existing water delivery networks using locally available materials contributed by the community. Cost-shared motor pumps provided additional irrigation for canals in Mopti and Timbuktu.

Over 8,700 acres of farmland were connected to new irrigation mechanisms:
29 new small dams
48 irrigation canals

In Sikasso, the project built small dams that created new wetlands for rice cultivation and generated positive upstream environmental effects: They strengthen the water table to prevent community wells from drying up, provide a place for animals to water during much of the dry season, and boost water retention in nearby soil. These infrastructure improvements will ultimately reduce farming costs and increase household income.

Year	Canals rehabilitated	Linear meters rehabilitated	Total hectares of rice perimeters
2010	11	8,800	730
2011	18	14,400	837
2012	11	12,035	446
2013	8	11,800	418
TOTAL	**48**	**47,035**	**2,431**

New farming practices and technology

*Yields in some value chains **more than doubled:***
***101%** increase for millet/sorghum*
***85%** increase for lowland rice in Sikasso region*
***40%** increase for Irrigated Village Perimeter (IVP) rice in the Mopti region*

Thanks to a comprehensive technology package of improved seeds, fertilizer and micro-dosing techniques, IICEM-supported farmers augmented their crop yields significantly over the course of the project. Demonstration plots in each commune of project intervention promoted IICEM training and technology, including new inputs, and reinforced farmer-to-farmer training.

Scarcity of improved seeds in Mali, particularly in the millet/sorghum value chain, remains a challenge for farmers and development projects. Feed the Future's requirement to promote new farming technology has great potential to improve crop productivity for partner farmers, but the current seed market cannot supply enough seeds for exponential growth. IICEM worked on both the supply side and with farmers to educate them about the benefits of improved seeds and stimulate demand while also building the technical and managerial capacity of seed multipliers to increase supply.

IICEM began work with seed cooperatives through a partnership with the Union of Maize Producer Cooperatives of Diedougou (USCPMD) in the Koulikoro region to encourage production of improved millet/sorghum seeds for regional distribution. Despite more availability, prices remained high and even rose following the 2012 crisis and subsequent purchases by humanitarian and development organizations, ultimately thwarting efforts to connect suppliers and IICEM partner farmers.

IICEM consequently shifted to demand creation and let the market play its role, focusing instead on disseminating this new technology to farmers who had never seen its potential before. This included training farmers in seed replication using best production practices and internal control systems for seed certification, post-harvest processing, and storage of millet and sorghum seed. This strategy was reinforced through distributions of improved seeds to target Feed the Future communities, each accompanied by one-hectare demonstration plots at cooperatives in 45 different villages in late 2013. These plots showcased the complete technology package of improved seeds, fertilizer micro-dosing and best practices promoted by the project to change behavior and promote technology adoption among farming communities—the first step to creating demand. Without understanding the potential of these new technologies, it is difficult for small farmers to justify high prices—and without support from the project, they rarely have the working capital to afford them.

Spotlight on Seeds: Millet/sorghum seed research and development in Mali

One of the largest barriers to sustainable increases in productivity for Mali's farmers is the availability, demand, quality and price of millet/sorghum seeds. The current market is underdeveloped, with inconsistent quality and availability limited to small quantities. Following is a brief recap of previous efforts to develop improved seeds in Mali and what must be done to facilitate wider adoption and a more developed market.

Over the years, USAID/Mali has helped establish and finance a network of partner institutions, including the USB *(Unité de Semence de Base)* of the IER (Rural Economic Institute), INTSORMIL CRSP, the WASA (West African Seed Alliance) project, ICRISAT, AVRDC and others to develop improved local varieties, including hybrids, of common cereal crops grown in Mali. INTSORMIL started a demonstration of the Grinkan variety in 2008, generating significant productivity improvements during the 2009-2010 season on nearly 2,000 ha.

However, most of the INTSORMIL sites were not FTF communities (selection for which occurred in 2012), and thus were eliminated in future IICEM programming. Moreover, the Grinkan seed provided by INTSORMIL to producer organizations in 2011 had very low germination rates, resulting in poor adoption levels. INTSORMIL shut down in 2011, making IICEM a significant player in the improved seed sector. In 2010, IICEM, in collaboration with IER and INTSORMIL, multiplied a new sorghum seed called Seguifa, which proved susceptible to mold attacks and was determined unready for large-scale testing and adoption. In addition, USAID/Mali also tried unsuccessfully to partner with the IER seed base unit.

Efforts to find improved, well-adapted varieties continued. Following USAID's request to expand to most of the 120 FTF communes, IICEM scaled up its outreach to 428 millet/sorghum producer organizations who cultivate a total of 25,000 ha. Only an estimated 5,000 ha of millet and 3,000 ha of sorghum benefited from improved varieties; however, due to the limited availability of improved seed. For FY13, approximately 210 tons of improved seeds were required to cover all project-supported cultivation. With seed production through USCPMD, IICEM was able to provide 72 tons of improved seeds, covering a third of the cultivated areas, or around 10,000 ha.

IICEM also distributed seeds to partner producer organizations to ensure wider demonstration of the benefits of improved seeds, and provide a new source of working capital to kick-start savings for future input purchases. Initial improved seed distributions required that partner producers save the equivalent amount of the seeds they received for future seasons using many of the same techniques employed by professional seed multipliers.

On the supply side, IICEM continued to expand the number of project partners involved in seed production and enhance their capacity to produce a greater quantity of high-quality seeds in accordance with the requirements of the local market. If improved seeds become more plentiful, farmers will be better able to afford them.

Above: From left, Rebecca Black, USAID Mission Director, an IICEM beneficiary, and Jean Francois Guay, IICEM COP, participate in an official input handover ceremony. Improved seed distributions provided a way to kick-start working capital savings, and demonstrated the potential of new technologies.

Fertilizer access is limited and not commonly used in rice and millet/sorghum value chains, with the exception of rice grown in Irrigated Village Perimeters. With lowland rice and millet/sorghum, few farmers had access to commercial fertilizer before working with the project, usually because their cooperatives lacked access to working capital to purchase inputs. The limited capacity of cooperatives and limited current technology adoption highlight the need to focus on agricultural intensification before other strategies, and the importance of the technology package. Use of new technologies provides a demonstration, albeit on a small scale, to other farmers working in these value chains in Mali.

Revenue Diversification

IICEM introduced activities to diversify revenues of farmers and women, increase their productivity and nutrition, and in some case, foster cash crops to boost economic growth.

Horticultural products

IICEM pursued specific high-value horticultural activities to diversify agricultural incomes and boost nutrition. In 2010, IICEM successfully completed large-scale tests in Sikasso and Sélingué to introduce new, higher-value varieties such as yellow and red pepper, various chili peppers, rainy season carrot and tomato, strawberry, grape, red cabbage, cherry tomato, cornichon and mushrooms. IICEM provided inputs and small equipment to help construct the demonstration plots, as well as technical assistance and training (largely for women) in best horticultural practices, organic production, sustainable agriculture, traceability and product labeling to respond to growing demand for healthy foods and environmental sensitivity. In addition, IICEM helped farmers better organize to supply their markets.

To improve gardeners' revenue in Bamako and the regional capitals of Sikasso, Mopti and Kayes, IICEM led market studies to

determine what are the high-value horticultural products sought by local restaurants and vendors. IICEM then provided inputs and small equipment, trained men and women in production best practices and organic gardening, hosted farmer-to-farmer exchanges, and established demonstration gardens in each city. This assistance led directly to new linkages between producers and clients, supporting a better-organized supply chain that assures quality, quantity and diversity.

In villages, IICEM first teamed with local masons to construct wells for17 hectares of garden in 2012; after some of these wells dried up in the dry season, the project switched to working through professional companies and built new cement wells that supported 24.5 hectares of market gardens; many in collaboration with another USAID/Mali project, Page-Nièta and AVRDC–The World Vegetable Center. IICEM also provided literacy training to all recipients, as a means to further empower participants and reinforce other program activities.

In 2013-2104 IICEM improved 24.5 Ha of land, which can be now used for vegetable gardening, this entailed providing fencing, gardening equipment and the digging of 96 wells.

Abt Associates also began the development of another 20.5 Ha of land for the purposes of gardening. This entailed the digging of 82 additional wells by subcontractors. Unfortunately, due to a late start of the well digging activities, caused by a delay in engaging the subcontractors (as a result of the USG sequestration), an unexpected lengthy rainy season, which delayed work on the wells (as sub-contractors had to wait for the water table to recede); some of these 82 wells could not be 100% completed by the project end-date of 1 March 2014. For the wells that were not completed by the IICEM end date, based on the suggestion by USAID/Mali that the Mission intends to engage its own resources in the completion of the wells, Abt Associates informed USAID that it will leave these wells in their current state of completion and ready for re-initiation of digging by another entity to be engaged directly by USAID.

Fish and rice-fish farming

In late 2010, IICEM launched its program for fish farming and integrated rice-fish farming to diversify producer revenues and increase availability of nutritional foods in the north and south of Mali. This component made three new technologies available and directly benefitted two agricultural firms. Tests proved that IICEM's improved management practices raised fish productivity and weights, and that integrated rice-fish farming activities improved rice harvests beyond average increases cited in literature.

IICEM's fisheries activities included training and technical assistance to introduce and disseminate new management practices at demonstration sites, strengthening the capacity of technical support services in the area, and selecting new work sites. The project provided nutritionally fortified fish food and worked closely with pond managers on feeding regimes, control tests to check progress, and water quality management—as well as connecting them to fingerling producers.

IICEM trained groups supporting this sector, including the Regional Direction of Fisheries and two NGOs—PEENAL and *Groupe de Recherche d'Etude et de Formation en Agriculture* (GREFA)—who provide monitoring and training services to agriculturalists and pond owners. IICEM teamed with the USAID-funded AquaFish CRSP (Aquaculture & Fisheries Collaborative Research Support Program) to train agents—alongside men and women who farm fish—in improved pond management and best practices for demonstration sites.

In the north, IICEM transferred the new technology of integrated rice-fish farming via two demonstration sites: an off-season rice parcel in Kouakourou and a rice parcel in Korientzé. Despite challenges, both demonstration sites proved that integrated rice-fish farming not only provides fish in the same amount of space, but improves rice yields. In Kouroukoro, the demonstration site yielded rice at a rate 6.37 MT/ha against a control plot yielding 5.20 MT/ha, and in Korientzé, the yield was 5.33 MT/ha against a control plot yielding 3.13 MT/ha.

In the south, IICEM conducted participatory tests of new management practices with fish farmers, strengthened the capacity of advisory partners, evaluated demonstration test sites in Sikasso, supported creation of a demonstration site in Yanfolila in the intervention zone for the *Agro Industrie Development Société Anononyme*, plus a site for integrated fish-livestock-vegetable farming in Morila, near a mining community, and identified new fish farming sites for the next year. Activities led to these results:

- Transfer of new technology or management practice through introduction of two polyculture (fish farming with two or more symbiotic species) demonstration test sites.
- One agricultural firm directly benefitting from project activities at the AID-SA Yanfolila site, where IICEM created a demonstration site as a field school for fish farmers in the area.

IICEM recommends future projects assist communities around profitable fish farm sites to better organize their marketing channels, and train fish farmers on production of maggots and termites as cheap protein substitutes for fish meal and peanut cake.

Additional Value Chains Prior to Feed the Future

IICEM began its activities in December 2009 with a scope of work that included a broad range of value chains in Mali. In 2011, following introduction of the U.S. Government's Feed the Future Strategy, USAID requested the project re-orient its activities towards millet/sorghum and rice and phase out activities related to the other value chains. The initial work in these value chains are summarized below:

Maize. In 2010, IICEM undertook an in-house maize value chain study and organized meetings of commercial operators. The project pursued efforts with major processors *(Moulins du Sahel, Grands Moulins du Mali)* to develop demand in new, high-value market segments, which were to ultimately drive upstream investments to improve productivity and quality. In the Sikasso region, IICEM provided technical assistance and training to producer organizations, which produced 7,600 MT of maize on 2,409 ha, directly benefitted 1,230 rural households: 624 in the Sikasso administrative department and 606 in the Bougouni administrative department.

Potato. IICEM assisted 43 potato cooperatives in producing 48,230 MT of potatoes on 2,204 ha, training 102 cooperative members on the proper selection and use of fertilizers for potato cultivation, as well as on best practices in harvesting.

Above: Above: After 17 years in traditional potato storage, Djibril Sanogo of Sikasso modernized his methods with help from IICEM. His storehouse was renovated and equipped with wooden crates, which will reduce potato spoilage and generate higher market prices due to controlled outflow—benefiting Sanogo and his 32-member household.

Before IICEM's intervention, the main bank in agriculture, BNDA, had stopped financing the potato sector due to non-reimbursement of loans. IICEM introduced the value chain approach to this value chain: working with potato seed suppliers and other players in a cluster, promoting a logistics platform, helping to establish a formal *Interprofession* or industry advocacy organization. After IICEM stopped direct support, BNDA continued financing the sector on the condition the NGO supporting IICEM's approach, *Groupe de Recherche d'Etude et de Formation en Agriculture* (GREFA), maintained close coaching of cooperatives. Four years later, BNDA is providing $2 million in annual financing to the potato sector, showing clear sustainability of IICEM's approach.

Altogether, IICEM's potato activities in southern Mali benefitted 2,427 rural households in 2010. In the south, where potato farming by men complements rice farming by women on the same or adjacent land, small dams constructed by IICEM in 2009 to boost rice production also rehabilitated 115 ha for potato farming. This led to a resurgence of potato farming—abandoned in some villages due to dried-up wells—for 128 producers.

In northern Mali, total production was 361 MT on 7.5 ha (19 MT in Mopti, 24 MT in Gao, and a whopping 317 MT in Timbuktu), directly benefitting 926 vulnerable households, including almost 400 in Timbuktu. While yields per hectare are not as high in the north, potato offers an excellent opportunity for income diversification. Yields in Mopti averaged 5 MT/ha; in Timbuktu, yields reached 20 MT/ha; and yields in Gao were 11 MT/ha.

Above: IICEM helps a community in Baguinéda establish a host free period, where farmers abstained from planting host crops during 2 months per year, as a means to reduce prevalence of the yellow leaf curl disease.

Tomato. In addition to activities described in the horticultural products section *(see pp 11-12)*, IICEM successfully introduced Integrated Pest Management (IPM) techniques, in collaboration with IER researchers and USAID's IPM CRSP, to combat tomato yellow leaf curl disease in tomatoes and other crops. IPM reduces or eliminates the disease vector, white flies, by creating a two-month period in which farmers in a multi-village area agree not to grow host plants like tomatoes, pepper and eggplant. IICEM worked with 22 villages of *L'Office du Périmètre Irrigué de Baguinéda* (OPIB), 30 km outside Bamako, to introduce this host-free period; most of this area (95%) was monitored by village brigades. These joint efforts successfully eliminated the fly and plants that host the yellow leaf virus, and yields returned to pre-crisis levels, around 20 MT per hectare; some farmers got 40 MT per hectare.

Before exiting this sector, IICEM in 2010 aided two government organizations assisting tomato farmers (OPIB and ORDS) to build on the project's momentum in finding solutions to maladies that decimate tomato harvests across Mali. IICEM helped create synergies with partners to promote the host-free period in Sélingué, and worked with private sector seed distributors and farmers to ensure availability of high-producing, disease-tolerant seed in targeted zones. This work responded to production challenges in advance of a new processing plant in in Sélingué.

Because improved tomato seeds had become too expensive for most farmers, IICEM joined forces with USAID's IPM CRSP in 2010 to increase the number of input providers of disease-tolerant and -resistant varieties. Four seed distribution agribusinesses directly benefitted from this assistance.

Above: IICEM facilitated purchase of a shallot grinder for these farmers in Dogon country.

Shallot. In the Mopti region's Dogon country, where people rely on shallot as a cash crop, IICEM introduced the full value chain approach, increasing productivity, access to finance, and commercialization. In 2009-2010, IICEM tried to unite the different organizations of shallot sector to create a logistics platform, a crucial yet difficult process.

Total production of shallot by IICEM partners in the north reached 1,597 MT—mostly in Timbuktu—directly benefitting 1,309 households. In addition to technical advice on ongoing production in Mopti, Gao, and Timbuktu, IICEM also conducted demonstration tests to introduce shallot farming to other sites and to test new varieties. More than 280 producers adopted new seeds and new technologies in Timbuktu and the Dogon Plateau.

Tiger Nut. IICEM introduced the value chain approach to this sector, introducing better agriculture practices, logistics and commercialization through warehouses and the creation of a Tiger Nut Producer Union, permitting them to better negotiate bank loans and sales contracts in Spain and the region. Twenty cooperatives assisted by IICEM's team produced 961 MT with an average harvest of 3 MT/ha, benefiting 470 rural households. Tiger nut sales by IICEM partners reached 1,330 MT (467 MT in domestic markets, 541 MT in regional markets and 370 MT in European markets, particularly Spain) with a total approximate value of 300 million FCFA (US$625,000). The project facilitated a contract between an exporter and the Tiger Nut Producer Union for 500 MT, destined for export.

Above: IICEM organized a series of training sessions for mango exporters like AOM packaging center, where station agents learned sorting techniques that lowered rejection rates while selecting homogenous fruits more likely to be sold in Europe. IICEM also connected partner companies with manufacturers of packaging materials that comply with certification regulations.

Mango. IICEM followed in the footsteps of an earlier USAID project, Trade Mali, in its initial work in the mango sector. In 2010, IICEM-assisted mango farmers harvested a total of 17,750 MT of fresh mangoes on 3,300 ha. In addition, IICEM trained 100 producers from 12 cooperatives representing 2,892 rural households in orchard management best practices, seedling management, and improved harvest and post-harvest handling techniques. Mango exports exceeded 3,300 MT, primarily in European markets, benefitting from an improved understanding of market demand criteria and an improved capacity to manage raw material supplies and logistics. The project's commercial partners also sold over 890 MT of fresh mangoes in sub-regional markets and 13,560 MT domestically. In the dried mango value chain, the processing group supported by IICEM sold approximately 7.7 MT of dried mangos, over 7 MT domestically, reversing a trend where most sales were in export markets, and showing that a large, diverse, local market exists for developing the dried mango value chain.

In 2009-2010, IICEM helped the country's new (and only) pulp factory, COMAFRUIT, develop its raw material supply chain. In 2010, COMAFRUIT bought 700 MT, giving producers 18 million FCFA (US$38,000) for a variety of mango too delicate for fresh export that likely would have otherwise gone to waste. In 2011, sales volumes increased to over 1,000 MT, giving producers $35 million FCFA (US$73,000) in new income. IICEM played a crucial role in introducing this new processor to Malian orchards and farmers—the cornerstone of their supply chain—and establishing relationships over the course of three years. In 2014, the CEO of COMAFRUIT told IICEM that he has bought six new trucks, and is constructing mango cartons. At full capacity COMAFRUIT can

buy more than 10,000 MT per year—a vital source of revenue for Sikasso and Koulikoro's mango farmers.

Cowpea. In 2013, IICEM identified 15 producer organizations in 13 towns from target Feed the Future areas near Bougouni, Koutiala and Sikasso which were intercropping cowpea and sorghum on 45 ha for soil-building and sustainable intensification of their agricultural system. In Mopti, IICEM introduced cowpea cultivation to five producer organizations, covering 100 ha. In addition to technical assistance, the project gave selected producer organizations 2,500 kg of cowpea seeds, enough to plant 25 kg on each hectare.

As a legume, cowpea enriches fragile agricultural landscapes through nitrogen fixation and improves soil structure and organic matter as a water-efficient cover crop. Rich in dietary protein, cowpea is an invaluable nutritional resource, one with ready demand and high value on local and regional food markets. The World Food Programme is a large institutional buyer of cowpea, and is interested in sourcing it locally. Because of its favorable contributions to rural livelihoods and potential market outlets, cowpea has great potential as a target value chain for Feed the Future projects.

By The Numbers:

More Productive Crops During IICEM								
Value Chain	Total Harvest (in metric tons)					Yield increase from baseline, in MT/Ha		
Year	2009	2010	2011	2012	2013	2007	2010-2013	**Growth**
Millet/Sorghum	0	0	5,437	2,554	30,685	.72	1.45	**101%**
LL Rice	539	2,263	3,872	4,676	4,960	.95	1.76	**85%**
Rice IVP	7,603	11,598	15,937	12,568	8,355	3.87	5.41	**40%**
Total	**8,142**	**13,861**	**25,246**	**19,798**	**44,000**			

Above: IICEM's applied technology packet doubled yields in some instances, creating a surplus of new crops that not only increased community food security, but provided an important new revenue source for rural farmers.

Below: The project continued to spread these new technologies to more Feed the Future communities, increasing the number of supported farming cooperatives by more than 600%.

Expanded Organizations, Cultivated Areas						
Value Chain	Partner Cooperatives			Cultivated Area		
	2009	2013	%	2009	2013	%
Millet/Sorghum	x	428	-	x	35,945	-
Rice	80	146	82	5,024	12,017	+139
Total	**80**	**574**		**5,024**	**47,962**	

*Baseline Data sources and calculation: The 2007 baseline is compared to the 3 year average of yields to give a more accurate representation of evolution over time and control for slight environmental fluctuations. This baseline is based on maximum yields results without the comprehensive technology package promoted by the project. It should also be noted that the increase in harvests is attributed to the increase of farmers supported by the project in addition to average yields.

- Millet: Result of .6 MT/Ha – National average as measured by the Rural Economic Institute (IER)\INTSORMIL.
- Sorghum: Result of .85 MT/Ha – National average as measured by the Rural Economic Institute (IER)\INTSORMIL.
- Lowland Rice (LL): Result of .95 – Baseline household survey by PRODEPAM 2007.
- Irrigated Village Perimeter Rice (IVP): Result of 3.87 IICEM PMP Based Year 1/2, Average of 18 producer organizations in Mopti.

2. ACCESS TO MARKETS AND IMPROVED COMMERCIALIZATION

Above: Issa Diarra, in front of an IICEM warehouse in Ntibougou, Sikasso. President of the warehouse management committee, Diarra organizes the storage of harvests from multiple cooperatives nearby to facilitate high-volume sales and ensure crop quality.

Market potential increased with each farmer who realized major production growth, with surplus crops acting as a catalyst to strengthen and build new cereal markets. IICEM's comprehensive strategy used market forces to strengthen relationships between value chain actors, helping each party augment their revenues and the capacity of their agribusinesses. IICEM's work—particularly in millet/sorghum—pioneered many significant firsts in Mali, though much work remains to sustain this progress.

After refocusing on just two Feed the Future crops—rice and millet/sorghum—IICEM addressed the weak points in each value chain. Lack of scale and capacity has kept these crops from realizing their full potential as both sources of food security and cash. Though more developed, the rice value still cannot respond effectively to many market opportunities: Mali's rice production falls short of demand by more than 100,000 metric tons, with rice

imported only because commercial links are not strong enough to deliver domestic rice everywhere needed. Millet/sorghum is patently underdeveloped and remains largely a subsistence crop. In both value chains, harvests are sold in small quantities at local markets, through informal sales to traders. As they visit producing villages, traders usually offer a fixed price, leaving little room for negotiations. These small, individual and irregular transactions lower the overall efficiency of cereal trade and reduce the bargaining power, and hence the profit margin, of small farmers.

Industrializing rice production and processing

With canal-irrigated rice in Mopti, IICEM set up more structured farm-gate sales of paddy by facilitating a contracting process that responds to rice mills' requirements in quality, quantity and price. The contracting process thus strengthened business relationships between producer groups, semi-industrial rice mills and financial partners. By streamlining the supply of high-quality raw materials, value chain players were able to generate predictable revenues and realize better returns in terms of volume, quality and price.

Rice in the Mopti region was traditionally hulled in small quantities by wholesale traders or farmers, leading to small volumes and inconsistent product quality. IICEM promoted industrialization through the establishment of two new rice mills with grants from the project's Strategic Activities Fund (SAF), which gave a 25% capital investment to leverage matching bank financing and equity contributions from each business. These mills' higher industrial hulling capacity and potential to scale-up niche products like parboiled rice and animal feed centralized demand for the increased production of partner farmers and enabled grouped sales to large-scale domestic and international buyers. IICEM nurtured these new players by promoting their access to bank loans, though due to Mali's recent crisis, bank lending has been limited.

Above: Packaged long grain and parboiled rice from the RIFAB rice mill. A semi-industrial mill like RIFAB is a vital link in a supply chain that moves on-farm production farmers to Mali's grocery stores and markets.

Lowland rice in Sikasso produced by IICEM partners has lower total volumes than from project partners in Mopti, as it relies on rain-fed irrigation rather than canals. Before IICEM's market-development efforts, these largely female cooperatives mainly fed

their families with their rice crops and commercialized only on a very small, localized scale. Project-led improvements, including more production and a better logistics platform, helped these cooperatives forge relationships—often for the first time—with cereal traders to commercialize their rice harvests. IICEM trained entrepreneurs in literacy, agricultural best practices, entrepreneurship and cooperative management. To facilitate on-farm processing, IICEM gave six rice de-hulling machines to cooperatives that made matching contributions, reducing manual labor and raising overall product quality. The project also encouraged cooperatives to add value to rice products to increase revenue, providing equipment and training for parboiled rice production and loans for hulling machines to help process rice on-site. These combined efforts led to a 200% jump in rice's gross margin for project partners since 2009.

"Last year we sold our surplus through a sales contract and earned a profit. The rest we kept to feed our families. We're cultivating twice as much this year with the profits."

Djeneba Goita, partner farmer, Nizanso

Taking millet/sorghum from a subsistence to a commercial product

IICEM's second major Feed the Future value chain had little commercial foundation or capacity, yet great potential. For centuries, millet/sorghum has been a nutritious and widespread subsistence crop in West Africa, usually cultivated in small quantities and consumed close to the farm. Concepts of quality, production and sale are rooted in generations of cultural practice. Without commercial infrastructure, it is likely that this important cereal value chain, totaling 2.5 million hectares of land in Mali, will remain a subsistence crop, a crucial missed opportunity to increase food security and income from commercial sales—key components of the Feed the Future strategy.

The challenge was to create an environment to foster millet/sorghum's transformation to a real commercial commodity. As with other target crops, IICEM started at the farm, promoting a technology package of improved seeds, best practices and commercial fertilizer, which raised yields by more than 100%. Next, IICEM encouraged new business relationships between partner farmers and traders by demonstrating quality improvements due to new infrastructure like warehousing and moisture meters and through formal sales contracts, a first for

After seeing higher quality millet/sorghum from IICEM partner farmers, Moulins du Sahel commissioned a test of millet flour. In 2013, the company signed purchase contracts with IICEM producers for over 5,000 tons of millet in 2014—the largest wholesale contract for millet/sorghum in Mali.

Mali's millet/sorghum value chain. With sales grouped together in warehouses, traders can purchase directly from farmers for a more efficient supply chain, while new sales agreements guarantee quality and quantity. Quality standards are crucial for high-volume buyers like the World Food Programme (WFP), which pays a premium for grains meeting specific grades and standards—incentivizing smallholder farmers to invest time and labor to improve grain quality on-farm, at the source.

IICEM also facilitated new high-volume purchases from the private sector. The grain and flour manufacturing company Moulins du Sahel normally processes wheat-based products, but after seeing the improved quality of millet/sorghum from IICEM partner farmers, commissioned a test of millet flour in 2012. The company noted the 98% purity and controlled humidity of crops stored in the warehouses of IICEM-supported producer organizations. In 2013, the company signed purchase contracts with IICEM producers for more than 5,000 tons of millet in 2014—the single largest wholesale contract of its kind in Mali and previously matched only by large humanitarian organizations.

New relationships like these require careful cultivation, an understanding of Mali's private sector and a comprehensive approach to strengthening market access. IICEM partners now have the commercial capacity to increase exports throughout the sub-region, including Ivory Coast, Senegal, Burkina Faso and Mauritania. Through the creation of the Cereals Advocacy Committee and new policy pieces related to trade barriers (see pp 18-19), IICEM has broken ground in efforts to reduce trade constraints in Mali.

Higher-quality crops

In addition to higher yields for producers, improvements in crop quality were essential to strengthening market systems. IICEM's quality improvement process built technical farming capacity through training and behavior change, enabling partner farmers to offer a more competitive product and gain quality premiums of 10% above average market value. In 2013, IICEM-supported producers achieved quality premiums from 15,000 to 40,000 FCFA per ton, creating additional revenue of over $200,000.

Quality assurance: Capacity building and training

IICEM raised partner cooperatives' awareness about the benefits of quality standards and communicated traders' quality requirements of traders. Project partners can now meet highly structured markets and quality standards for trade both inside Mali and within the sub-region. The value of cereals and processed

products is increased, post-harvest losses (primarily through new equipment like warehousing and moisture meters) are reduced and ultimately, more revenue is generated.

IICEM developed and popularized a manual covering basic quality concepts and best practices from planting to post-harvest, including marketing, quality assessment tools, proper documentation, quality and inventory control, Malian and international standards, and governmental bodies charged with regulating crop quality. The project used training and behavior change principles to reinforce adoption of accounting, administrative and structural management tools by more than 500 farming cooperatives, six major grain wholesalers and over a dozen grain processing enterprises. Other training included improved storage techniques, best practices in post-harvest management, good hygiene approaches and improved transformation technology. IICEM also created and trained community management committees charged with supervision and quality control of warehouses. These committees are community representatives who link local producers with processing plants and wholesale traders, ensuring that the business relationships formed by IICEM endured beyond the life of the project. These committees also serve as marketing focal points, demonstrating compliance with national traceability standards, improved storage practices and higher quality products.

Formally contracted sales

*IICEM-supported partners sold a total of 3.03 billion FCFA millet, sorghum and rice in 2013—**more than half through 222 formally contracted sales**.*

The contracting process—a first for Mali's millet/sorghum value chain—strengthens collaborative relationships between buyers and sellers, formalizes sales and offers a guarantee of revenue to lending institutions. The success of farm-gate sales agreements between IICEM-supported producers and wholesale traders, of which more than 95% were fulfilled in 2013, demonstrates that local grain can be competitively traded on a commercial scale. These developments are largely attributed to improvements in quality, logistics and capacity, realized throughout the project.

IICEM used the process of contractualizing sales to catalyze market development, targeting key areas for improvement and

most importantly, building new business relationships. The shift from traditional subsistence farming to a more profitable commercial agriculture system is ongoing and has significant potential for rural farmers in Mali. More structured sales facilitate economic growth and increase rural incomes, but this evolution depends entirely on the capacity of value chain players. The following steps laid the foundation for IICEM's comprehensive, market-based approach:

1. Growth markets identified along with potential customers in target value chains, plus their market requirements, particularly wholesale traders with specific quantity and quality needs.
2. Direct relationships forged between farming cooperatives, wholesalers, retailers, mini- mills, input suppliers, and processing units of various sizes from the millet/sorghum and rice value chains.
3. Diagnostic tools and site visits to form a complete picture of the strengths and weaknesses of each value chain member, along with recommendations for improvement.

The contracting process is the most important step to formalizing cereal markets, encouraging more accurate quantity forecasts and quality stipulations early in the growing season. Through this process, IICEM helped farming cooperatives better forecast their harvests and sales, leading to more effective financial management and ultimately newfound access to bank loans.

Improved logistics platform

IICEM constructed: ***149 warehouses*** *with an estimated capacity of over* ***16,000 tons of cereals***

Higher quality standards and structured sales rely on logistics infrastructure that can support these fundamental changes to the market system. IICEM introduced technologies that improved crop quality, reduced post-harvest loss and organized raw materials more efficiently.

New warehouses helped boost crop quality and larger-scale commercialization. The construction of each warehouse was matched by community contributions of sand, gravel and manual labor. These warehouses are part of an integrated agricultural development strategy that considers other project interventions (such as improved irrigation infrastructure) and the unique geographic advantages and challenges of each site. IICEM linked producer organizations within a 10-15 km radius of each site to boost their impact and establish a group of farmers that worked together to manage and share the warehouse. By pooling their resources, farmers reduce their fixed costs and can manage their

farm gate sales more effectively through aggregation, sorting, and consolidation of every harvest. More secure storage also increases community food security and improves the positioning of producer organizations when they negotiate cereal prices.

Abt Associates built and completely received 47 warehouses in 2013, for a grand total of 149 warehouses constructed under the IICEM project with a total storage capacity of 16,625 MT.

Abt Associates, via its sub-contractor WASSA, initiated the construction of an additional 3 warehouses during 2013 in the villages of Zaradougou, Finkoua and Missirikouro. These warehouses; however, could not be completed by the project end-date of 1 Mar 2014 due to *force majeure*; specifically violent winds in the months preceding the rainy season in the Sikasso Region that resulted in collapsed walls as the cement had still not cured at the time of the storms. This event posed financial difficulties for WASSA. Abt Associates attempted several remedial actions during the remainder of the year to complete these warehouses, while still maintaining the WASSA contract, but ultimately there was not enough time finish the warehouses and IICEM had to release WASSA from its sub-contract. Based on the USAID/Mali's claim that the Mission intended to engage its own resources in the completion of the construction on these warehouses, they were left in their current state as of the project end-date and ready for re-initiation of construction by another entity managed directly by USAID.

In addition to warehouses, the project provided 23 millet/sorghum threshing machines after a deposit of 5% cash down from farming cooperatives with predominantly female members. This new equipment increased productivity and helped cooperative members sell higher quality products by removing physical impurities like stones and dust, reducing post-harvest losses from an average of 10% to less than 1%. With better products to sell, and less time spent on this intense manual labor, female farmers can focus on managing and marketing their businesses.

Reduced trade barriers

Enabling environment for trade and private sector development

Through lobbying, advocacy and information dissemination to target value chain operators, IICEM helped improve the fluidity and efficiency of trade in cereals for the rice, millet and sorghum destined for both domestic and sub-regional markets. Per the Feed the Future results framework, cereal trade constraint

IICEM Approach to Dismantling Trade Barriers within West Africa

analysis and advocacy is essential to establishing a regulatory environment that facilitates improved agricultural productivity and community food security. The project worked with a range of stakeholders—including government representatives and private sector businesses—to forge new advocacy efforts to engage cereals stakeholders who have long been under-represented in Mali's policy-making circles. While Mali's Chamber for Agriculture (APCAM) represents all farmers, marketing and export interests are often addressed inadequately, particularly regarding cereals. IICEM outlined a series of institution-building steps which enabled local actors to continue advocacy efforts after the end of the project, based on the approach at left—though given the difficulties of working in Mali in recent years, IICEM was not able to fully deploy every aspect of this integrated strategy. The first step, identifying barriers, was accomplished, along with significant initial progress in the second and third steps, which focused on building stakeholders' advocacy ability and raising public awareness of regional trade regulations. For the fourth step, monitoring compliance, IICEM supported the monitoring efforts of the regional initiatives under UEMOA's *Observatoire de pratiques anormales* (OPA), USAID's West Africa Trade Hub and USAID's regional agricultural trade project ATP/E-ATP. Mali still lacks a national public or private body dedicated to monitoring compliance with national and regional regulations related to the free movement of cereals, although the cereals advocacy committee now plays part of this role. These individual efforts are outlined in more detail below.

Analysis of regulatory gaps

IICEM's two policy papers clearly showed the importance of eliminating trade barriers in countering the threat of food insecurity. The largest of these barriers was determined to be the inconsistent application of regional regulations across Mali with regard to the free movement of cereals between countries. In order to fulfill its ultimate role as "breadbasket" for the sub-region, Mali will need to ensure that UEMOA and ECOWAS provisions are strictly adhered to, with regular monitoring and evaluation efforts. Participants surveyed agreed that gaps in application of these regional regulations only serve to increase the transport and marketing costs of cereals, reducing the purchasing power of already impoverished Malians and discouraging investment in the agricultural sector. Boosting cereals exports from Mali can bring short- and long-term benefits and encourage traders to adopt a more professional approach to their business. Food security in Mali will be more easily achieved if public and private sector stakeholders prepare themselves for considerable

Above: Cereal trade stakeholders participate in a working meeting to discuss export regulations and refine the roadmap for the cereals advocacy committee—an independent body that IICEM helped create.

increases in both import and export volumes of cereals. Expanding markets for agricultural products will make it possible to achieve economies of scale, improving competitiveness by reducing costs. *The creation of a cereals advocacy committee:* IICEM fostered a new cereals trade working group to tackle advocacy issues like exportation, international and regional tariffs and forge stronger and more communicative relationships with Mali's government officials. Over the course of the project, IICEM increased participation in the working group by helping its members take stock of initiatives underway, identify new synergies and further refine the roadmap for improved transport and international trade advocacy. IICEM facilitated the expansion of this group in each region, to help decentralize advocacy and information sharing. IICEM's support included development of communications materials to educate stakeholders about their rights, raise awareness of actual regulations and reduce sporadically or incorrectly applied tariffs/bribes. These materials included laminated trader-transporter cards—validated by the Customs and Trade Departments of the ECOWAS Commission—that listed key documents needed for Malians to engage in cereals trade and summarized ECOWAS and UEMOA regional rules for free trade in cereals. IICEM also developed and distributed to key partners a brochure for traders and transporters explaining their rights and responsibilities, the details of the rules related to intra-regional trade, and tips for doing business effectively in the Sahel region. The cereals advocacy committee is now able to organize itself with support from Mali's National Employers Council (CNP) and has called on Mali's new administration for immediate and long-term action to ensure freer movement of cereals both inside and outside the country.

3. IMPROVED ACCESS TO FINANCIAL SERVICES

Above: Oumar Sidibe, IICEM's BDS Specialist from Mopti, works with stakeholders, including farmers, traders and bankers to discuss best practices in bank financing.

Mali's banks have always been reluctant to lend to the agricultural sector, due to the inherently risky nature of farming and poor repayment track records. A few lent to rice farmers, whose irrigated crops were more reliable, but loans for the rain-fed millet/sorghum value chain—the most consumed staple crop in Mali—were almost nonexistent. The low organizational capacity of many farming cooperatives presented an additional barrier to creating a dependable repayment environment.

IICEM's market-based approach built strong relationships between all players in the value chain, stimulating new investments and reinforcing lending institutions through a toolbox comprising a loan guarantee fund, strategic grants and overall capacity reinforcement. Three key, project-driven improvements also helped reduce risk and facilitate lending:

1. Structured contracting and other formal sales arrangements to instill higher confidence at banks.

2. A productivity package of improved seeds and fertilizers to boost production, often doubling the yield in millet/sorghum, generating a surplus to commercialize.
3. Close coaching of producers' cooperatives by field agents, to help them formulate credit requests and monitor production, sales, and credit reimbursement.

At the other end of the value chain, the project facilitated private sector investment and grew the capacity of key cereal processors and rice mills. Grants from IICEM's Strategic Activities Fund and Innovations Fund reinforced key value chain players with new industrial equipment, raising their market capacity.

Professionalization of value chain actors

IICEM trained more than 22,000 beneficiaries over the course of the project, helping professionalize and develop the capacity of farming cooperatives

IICEM prepared project partners to be credit-worthy borrowers through an initial assessment of each agribusiness, which flagged deficiencies in management, organization and structural capacity that hindered their ability to take advantage of market opportunities and access credit. IICEM developed an assistance plan for key players—including farming cooperatives, grain traders and processors—that mixed individualized support with a training program to reach as many beneficiaries as possible and included one or more of the following features:

- Selection of strategic beneficiaries from leading SMEs via a call for applications for technical and financial support and farming cooperatives from USAID's predefined areas of intervention
- Questionnaires to identify key concerns, strengths, and weaknesses of agribusiness leaders and shape the nature of technical assistance
- Development of business plans to provide a strategic vision and enable these entrepreneurs to pursue their short and medium-term business objectives
- Introduction of simplified management tools in cooperative governance, recordkeeping, managing customer accounts, cash flow, and basic software
- Coaching on how to best access to services.
- Training in administrative and financial management, cooperative governance and structure in addition to marketing and improved agricultural techniques.

This system of close support takes significant time and effort to realize systemic leaps in technical and entrepreneurial capacity.

The more than 3,300 new loan recipients supported by the project demonstrated adoption of:

- An entrepreneurial culture based on good management and cooperative governance
- Quality and improved post-harvest best practices to create a more competitive product
- More productive technologies, such as fertilizer micro-dosing, the System of Rice Intensification, use of improved seeds and harvest storage facilities.

Project Beneficiaries Trained By IICEM									
2010		2011		2012		2013		Total	
Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
2,307	1,080	2,986	940	4,391	1,985	5,947	2,532	15,631	6,537

Reinforcement of lending institutions

Recovery of guarantee funds was 1.4 million USD or 94% of the initial investment amount

IICEM originally pursued relationships with the BNDA, BMS, BICIM and Kafo Jiginew. While other lenders were willing to provide some credit to downstream agribusiness enterprises, the BNDA was the banking partner that showed the most interest and ability to provide primary agricultural production credit. Thus, the project collaborated closely with upper management and local branch representatives of BNDA to introduce them to new lending opportunities to producers in the grains sector.

From 2010-2013, IICEM's partner firms and institutions received 513 loans totaling 3.392 billion FCFA (6.9 million USD). For producers, this new credit can be attributed to their significant leaps in technical and business capacity as well as their ability to sign pre-season contracts with potential buyers, such as wholesalers and processors. For the downstream agro-enterprises—like cereal processors and mini-rice mills—IICEM encouraged new private-sector investments both by increasing their technical and business capacity, and by strategically deploying partial matching funds from IICEM's grant monies.

Loan guarantee fund

IICEM's financial access strategy promoted a culture of repayment by value chain actors who were fully vetted and recommended to the bank as credit-worthy borrowers. To further help banks move into new lending markets, IICEM's guarantee fund and helped financial institutions provide loans to partner producer organizations for the first time. The balance of delinquent loans

was insured at 50% for the first loan, 25% for the second loan and 0% for following loans, helping the bank enter into new agricultural markets but still carry enough risk to ensure a sustainable outcome for future loans

Above: "*It is not the role of the bank to build the capacity of actors; we loan to people that already have high capacity. It is the role of the government and of the international agencies to build this capacity.…That is why we must certainly acknowledge USAID and IICEM for playing this incredibly important role, for training and supporting the agricultural sector and working alongside farmers to help them prepare to work with our bank. This function is essential to assure the sustainability of agriculture in Mali, to create an environment where the bank can lend to farmers, provide credit and reduce lending risk*" Moussa Allasane Diallo, President and Director General of the BNDA, speaking at IICEM's Lessons Learned workshop.

The 94% reimbursement rate on this loan guarantee fund is exceptional in Mali. The fund covered loans to the rice value chain in the northern regions of Timbuktu and Mopti, areas significantly affected during the recent political crisis. Mali's banks lost more than 2 million USD in the north, but the majority of IICEM's partners repaid their debts, resulting in only a slight overall dip in the reimbursement rate. This partial guarantee mechanism has helped banks build capacity in a new lending area—which in 2013 continues without any guarantee from IICEM—and has helped over 3,000 individual producers establish a good credit history that will continue well after IICEM.

Through IICEM, Mali's millet/sorghum farmers were financed for the first time from a major bank.

Evolution of financing in the millet/sorghum value chain

The professionalization of partner cooperatives and their new business relationships bore fruit after lengthy technical and business support from the project, which introduced a process for partner producer organizations to assess their financing needs at the beginning of the agricultural season. Technical assistance from project field agents helped partner cooperatives better estimate their input needs for each planting season in addition to providing training in best agronomic practices and the introduction of improved seeds. This comprehensive support

meant farmers could give a more realistic harvest forecast to wholesale traders, making sales more predictable and stabilizing markets. IICEM helped formalize these transactions through purchase contracts, another first for Mali's millet/sorghum value chain, which offer a guarantee of revenue to farmers and further reduce bank exposure. Traders collect grain from purchase contracts and pay directly into producer organizations' bank accounts, streamlining loan repayment.

Millet/Sorghum Loans over the Course of IICEM										
2010		2011			2012			2013		
Number	Amount (million Fcfa)	Number	Amount (million Fcfa)	Annual Growth	Number	Amount (million Fcfa)	Annual Growth	Number	Amount (million Fcfa)	Growth
6	**2.1**	**62**	**96.1**	**3793%**	**65**	**85.6**	**2%**	**103**	**167.1**	**95%**

Promotion of entrepreneurship and private sector investment

*More than **$9 million** in additional financing from the private sector was leveraged through IICEM's strategic investment funds.*

IICEM supported partner enterprises with grants from the Strategic Activities Fund and Innovations Fund to leverage private-sector investment, in processing units, which expanded demand for raw materials. Technical assistance helped them develop focused, market-oriented business plans, computerized commercial and operational databases for "real time" decision-making, and enabled infrastructure investments for a more organized, structured raw material supply chain. Each strategic investment was guided by recommendations from IICEM, with candidates judged by the viability of their project idea, their level of management and business experience, and the availability of sufficient capital.

In each investment, the enterprise contributed 25% of the total project cost and IICEM funds provided an additional 25%. Loans from banking institutions, primarily the BNDA, comprised the remaining 50% of the project cost, with each loan application supported by the project. More than $8.8 million was invested in 12 projects over the course of the project, including two millet/sorghum processors, three cereal distributors and three rice processing mills. These tools have allowed the industrial processing companies like RIFAB in Mopti and Danaya Cereals in Bamako to increase capacity, generate more demand from their suppliers in target value chains, and ultimately leverage matching private sector investments to grow their businesses.

Helping the unbanked access working capital in Mopti

In 2013, partner farmers saved enough working capital to finance the entire technology package of improved seeds, fertilizer and best-practices promoted by the project.

In early 2012, poor rainfall and deteriorating national security disrupted markets and the availability of financing for agricultural inputs, culminating in the closure of banks and a programmatic withdrawal by USAID from northern areas. In response to this crisis, IICEM mounted an emergency input distribution to help farmers secure their harvest, including seeds, fertilizer and fuel.

The project promoted sustainability in the intervention by requiring farmers to save the equivalent amount in crop sales to finance inputs for future planting seasons. In Mopti, 100% of participating millet/sorghum farmers saved enough capital to cover inputs for the next campaign—an enormous success in an environment where banks are still unwilling to lend to much of the agricultural sector, in any value chain. Farmers realized a successful harvest, meeting and in some cases even exceeding production targets, which enabled successful savings of working capital for next year.

By supporting incremental increases in the fund each year producers can independently finance inputs like improved seeds and fertilizer that are the foundation of improved production. IICEM promoted this model through further distributions in Timbuktu in 2013, providing a source of working capital for farmers who were unable to receive financing from banks.

Building Working Capital in Mopti: Savings Revenue From 2012-2013 crop sales

	OP	Stock, in Tons		Stock in FCFA		Sales Actuals		% complete
		Target	Actual	Target	Actual	Volume (MT)	Value FCFA)	
Millet	81	1,591	864	175,078,200	164,678,100	864	164,678,100	**94%**
Rice	61	2,434	2,641	365,130,000	410,049,756	2,641	410,049,756	**112%**
Total	**142**	**4,025**	**3,505**	**540,208,200**	**574,727,856**	**3,505**	**574,827,856**	

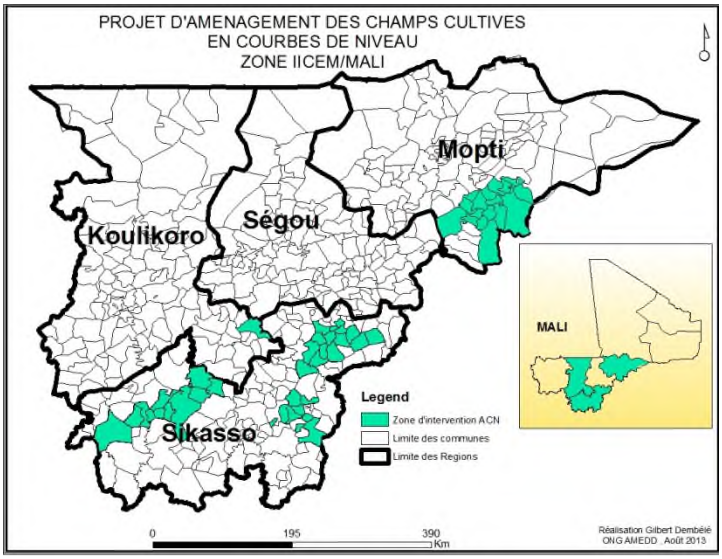
4. BUILDING RESILIENCE TO CLIMATE SHOCKS

Above: Trainers from IICEM partner NGO AMEDD work with project partner farmers in the Koutiala region to survey and stake contour bunds to better manage water runoff during rainy months.

Contour bunds

Contour bunds, known as *aménagement en courbe de niveau* or ACN in French, guide water runoff to prevent loss of topsoil, increase water retention, boost crop yields and ultimately strengthen community resilience to floods and drought. This technique reduces the amount of fertilizer needed, saving farmers money even as their yields remain high. IICEM improved 1,800 ha of land with contour bunds, which have the potential to increase crop yields by up to 30%. ACN also builds resilience to climate crises like drought and floods by more efficiently managing runoff during high rainfall and protecting soil during periods of drought. IICEM trained partners on technical mapping and geo-referencing to enable them to map and measure land plots, showcasing these techniques via demonstration plots in target communities.

In total, 483 representatives were trained on how to deploy contour bunds in each project intervention region. The training module includes an assessment of local techniques for erosion control and soil conservation. ACN is based on three key issues: control of humidity in the soil, conservation of fertilizer and erosion control. Each training session emphasized these principles, using a hands-on approach that helped farmers learn how to adjust their cultivation strategies relating to moisture management, fertilization and soil conservation. Each participating farmer was trained in the diagnostic process for surveying each area, how to stake fields properly for digging, in addition to maintenance techniques.



Natural resource management and biodiversity conservation

IICEM's activities improved natural resource management (NRM) in the Koulikoro, Sikasso, Mopti, Timbuktu, and Gao regions in 2010-2011, including development of local conventions on forest resource protection and exploitation, as well as establishment of grazing plans, fisheries, and hippo grass management areas. Specific activities included:

- To stabilize dunes in Gobi, IICEM introduced the technique of mechanically stabilizing sand dunes by erecting a fence of *Leptadenia pyrotechnica* cuttings, biologically stabilizing the dune using *Euphorbia* cuttings, and cultivating watermelon in between. To meet a joint request of the Benkadi cooperative in Gobi, the administration, and the communal authorities in Korombana, IICEM engaged a private enterprise that fixed 28.5 ha of the estimated 150 ha dunes threatening the community. Ninety percent of the *Euphorbia* cuttings have rooted, and 200 youth received practical training on mechanical and biological dune fixation, including how to properly harvest *Leptadenia*.
- IICEM helped stabilize dunes near Lake Horo, complementing its efforts to boost rice production and productivity there. To stabilize dunes between Echell and Maritondi and reduce lake sedimentation, the project completed maintenance on *L. pyrotechnica* dead fencing and *Euphorbia* live fixation on 40 hectares.
- IICEM also supported reforestation of the basin between the dune and Lake Horo. Species chosen by the local population for the targeted six-hectare expanse are *Prosopis juliflora, Acacia senegal, Piliostigma reticulata*, and *Eucalyptus camaldulensis*. Due to lack of water, the seedling survival rate was about 30%. The village of Maritondi has experienced an exceptional lack of water this year, and the wells have dried up.
- IICEM coached 14 women's organizations and mixed-gender community groups to complete a portion of the greenbelt around Diré, protecting the Niger River and the basis of Saouné's socio-economic development. The groups completed 25 hectares of the 40 hectares targeted for the year—as seedlings need to be watered during the hottest months of March, April and May, all original sites

without a year-round water source were eliminated. On the 25 remaining hectares, trees planted had a success rate of 95%. The community selected eucalyptus as the focal tree species due to its rapid growth and many uses.

- IICEM provided financial and technical support for the development and establishment of 20 local agreements, protocols, or other regulatory reforms, including the planning and management plan for the Bougouni-Yanfolila Forest, since approved by inter-ministerial decree. Sixteen agreements were signed in Timbuktu—including 14 agreements between local community groups and the mayor to support management of the greenbelt around Diré—as well as conventions in Sibonné and N'Gourouné. The program also facilitated two fisheries management conventions in the Korombana commune and a forestry management convention for the Samori Forest in the Mopti Region.
- A climate change adaptation specialist from Abt Associates led a training of 26 technical specialists at IICEM on climate change adaptation basics as well as the participatory Community-Based Risk Screening Tool (CRiSTAL) which helps community members and development planners integrate risk reduction and climate change adaptation into community development projects. Following the training, IICEM field-tested the tool with 33 participants in Diomatènè village. Funding constraints limited its further implementation.

Following the USAID biodiversity earmark in 2009, IICEM pursued efforts in 2010 on the Sourou floodplains (Mopti), encouraged the classification of the Bagoé River, and worked in the protected area complex and the classified forests of Bougou-Yanfolila (Sikasso).

New Malian law: Protected area and classified forest of Bougouni-Yanfolila

The principal objective of ecological monitoring was to monitor the impact of reduced human activity on biological diversity (fauna and its habitat). Nearby dwellers and site visit reports document remarkable improvement in appearance due to reduction in human activity. IICEM's biodiversity specialist observed an obvious improvement in the natural regeneration of the entire complex, especially of the *Isoberlina doka* (chô) and the *Daniella oliveri* (sanan). The Djinétoumanina classified forest distinguishes itself by the predominance of Detarium. The improvement in habitat quality has led to subsequent reemergence of large fauna, illustrated by the return and the one-month stay of a six-member elephant herd in the classified forest of Djinétoumanima (16,180 ha), which hadn't occurred in over 25 years. Also, members of a USAID mission in April 2010 saw *Hippotragus spp* ("dadié") antelope dung, and hunters say they now see small herds of these.

Above: Forestry agent in the Djinétoumanima forest, which, though classified in 1986, had no protection activities until USAID and IICEM's efforts in partnership with the National Administration of Nature and Conservation,

In conclusion, it appears activities supported by USAID through IICEM significantly improved the Djinétoumanima classified forest.

Following these efforts, the Government passed a law to protect the 200,000 hectares of the Bougouni-Yanfolila complex.

New Ramsar site for Mali: the Sourou watershed

IICEM conducted a bird study in 2009-2010 with the Global Water Initiative (GWI) to develop a master plan to gain international recognition within the Convention on Wetlands of International Importance— popularly known as the Ramsar Convention—an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The study demonstrated that the Sourou has more than 30 rare bird species, complying with Ramsar site criteria. The Government finally gained international recognition of the Sourou watershed in 2012, which will boost international resources and attention for this special watershed and improve protection of the 15,300 square kilometer Sourou basin.

Delineation of the Bagoe forest

The Bagoe River crosses the Sikasso and Koulikoro regions and is bordered by one of Mali's preserved forests as well as by 63 villages spread out over 18 communes in the four circles of Bougouni, Kolondièba, Kadiolo and Sikasso. After awareness-raising sessions in each village, riverside populations have deliberately ceded portions of riverside land. Each portion is between 100 meters and 2,000 meters, bringing the total surface area to 49,840 ha. IICEM commissioned a study to determine the provisory limits of the strip of land to be classified, followed by the classification commissions of each of the four circles. The National Water and Forest Direction has developed a document which includes all the necessary documentation to classify the forest, which must be submitted to the council of ministers to obtain the classification decree, which will determine the real limits of the Bagoe forest. The process was paused following the political crisis of the north of Mali.

Environmental monitoring and mitigation plan

IICEM developed an environmental monitoring and mitigation plan (EMMP) in 2013 to comply with USAID environmental regulations that require potential environmental impacts of USAID-financed activities be identified prior to a final decision to proceed and that appropriate environmental safeguards are adopted for all activities. The EMMP described how conditions set forth in the IEE was implemented on the ground to mitigate any adverse impacts of activities on the environment was submitted and approved by the COR.

All NGO partners were trained in August 2013 in procedures and reporting on the EMMP (from project planning through implementation and reporting). Attention was given to proper use of the mitigation checklist, how to insert the EMMP in the various environmental reports, and the use of the environmental participatory tool. These trainings also covered the analysis of how construction techniques are managed in Mali, including HIMO construction by project beneficiaries. The trainings covered how to work with these groups and properly implement mitigation measures. All these trainings were periodically audited to ensure they conformed to the aforementioned manuals that had been vetted by staff.

In addition, IICEM used environmentally friendly production systems and best practices during the course of activity implementations. Trainings were done with the different standards of USAID and for the watershed small irrigation schemes (small dams), IICEM produced a report, demonstrating the small environmental effects of the irrigation schemes. Some tree plantations were done in some sites due to the construction. As most sites were done on lands already used by agriculture, the environmental effects were minimal.

5. ENSURING GREATER GENDER INCLUSION

Above: Hawa Sylla, cooperative member from M'pegnesso, Sikasso participated in a number of IICEM literacy trainings and learned how to make parboiled rice, a high-value commodity that increases family revenues.

"*With the project, we have more profit that we didn't have in the past. There are so many benefits to the project; I can't even name them all.*"

IICEM aligned its ongoing gender inclusion efforts to USAID's 2012 Gender Equality and Female Empowerment Policy framework, guiding programming to address issues outlined in targeted gender assessments for each intervention area.

IICEM's trainings strengthened the technical and business skills of all female partners to increase economic opportunities and close knowledge gaps in the rice, millet and sorghum value chains. Infrastructure like threshing machines and rice-hullers reduced the intensive manual labor of processing and harvesting crops, freeing up time for women to reinvest in their businesses and families.

Support to Mali's millet/sorghum processing sector

"I did a number of literacy and financial trainings with the project. I know how manage my money now…the project helped me to better manage my cooperative.

Maimouna Sanogo, Cooperative President Korowegdougou, Sikasso

In the millet/sorghum value chain, post-harvest processing is managed almost entirely by women (80-100%, depending on the region). Although women possess a higher technical ability than men in processing, they lacked resources and knowledge to effectively manage their businesses. Access to working capital was a particular constraint flagged in initial IICEM assessments, inhibiting female entrepreneurs from growing their cereal processing operations, and financing key elements like warehousing, processing capacity, packaging and transport. Women have little access to services to increase their capacity, especially in business management, and are often not placed in leadership positions because of this. Access to technology, especially industrial equipment, is more limited for women than men, given this lack of capital and capacity. With these constraints in mind, the project rolled out a series of solutions targeting women in the millet/sorghum processing sector. Implementation of the IICEM Innovations Fund was modified for female participants, providing grants up to 45% of the total value of investments (compared with 25% for men), with down payments reduced to 15% (versus 25% for men). This enabled enterprises to benefit from a targeted intervention to develop new assets, industrial space and capacity building.

Above: Yapé Tessogué, the president of the Logo women's cooperative in the Mopti area, and Andrew Young, Deputy Chief of Mission, U.S. State Department participate in an official handover ceremony of a millet/sorghum threshing machine in Bamako in October 2013.

New threshing machines to help female farmers save time

Lack of working capital greatly constrains the availability of industrial equipment. To help those without access to banking services or other credit, IICEM distributed 20 threshing machines to female cooperatives that had shown the greatest potential in trainings; to foster ownership, IICEM requested a 5% cash contribution before providing equipment. Although not a new technology, these

machines are not widely used in the millet/sorghum sector in Mali; the majority of cereal is still threshed by hand—and in the millet/sorghum value chain, post-harvest processing is managed almost entirely by women (from 80-100%, depending on the region). A threshing machine can reduce an entire weeks' labor to less than an hour, increasing productivity and helping sell better quality products by removing physical impurities like stones and dust. With better products to sell, and less time spent on this intense manual labor, female farmers can focus on managing their businesses.

IICEM did the initial installation and trained women to operate the machine. Future projects should train the groups in management to operate the threshing machines as a business, increasing revenues— as IICEM also did for the dehullers it gave to women's rice producer organizations *(see p. 44).*

Support to a cluster of millet/sorghum processing enterprises

IICEM's strategy to further support the millet/sorghum processing sector and to grow women's entrepreneurship targeted 10 female-owned and -staffed micro-enterprises to work with project-supported cereals processor Danaya Cereals *(see story, next page)* by filling niche/intermediate markets as small-scale processors. IICEM organized these businesses into a cluster and evaluated each business to guide project training, which covered creation of new products, processing best practices and entrepreneurship. Finally, three of the most promising enterprises were chosen for further development, including a detailed diagnostic to serve as a foundation for a business plan and future credit application.

Above: IICEM helped solidify banking relationships for project partners by helping them professionalize and gain the confidence of lending institutions like BICIM, which approved a loan to Danaya Cereals in 2013.

Together with Danaya, this cluster comprised more than 50% of millet/sorghum processing in and around Bamako. Entrepreneurs shared business knowledge and increased their revenues while helping Danaya expand its market reach and processing capacity. Focusing on this cluster of processing businesses strengthened end-market players in the millet/sorghum value chain, and significantly expanded employment opportunities for women.

Female-owned and operated Danaya Cereals triples production capacity

Danaya Cereals, led and largely staffed by women, has become an industry leader in recent years, creating more income and jobs as demand grows for their popular line of cereal products. Danaya has more than doubled annual sales since IICEM began working with the company in 2009. The 36-person firm is led by Aissata Thiam, who is grooming her daughter Halatou, now Danaya's finance and operations manager, to eventually take over the family business. To help meet increased demand, IICEM helped Danaya partner with a wholesaler for the first time. Through a single contract with Keita Cereals, Danaya aggregated purchases from more than 120 farmers, guaranteeing a more consistent supply of raw material. This grain is also higher in quality—IICEM co-financed a new grain cleaner to help Keita reduce impurities from 10% to less than 1%. IICEM specialists also trained staff in accounting, marketing and supply chain organization, in addition to helping the business negotiate with banks to meet financing needs.

In 2013, IICEM's assistance helped Danaya secure a $158,000 loan from BICIM bank to finance completion of a new production plant. This allowed the company to speed up the completion of the infrastructure project, financed in part by IICEM's Strategic Activities Fund, and solidify a timeline to open the new processing plant by January 2014. The new factory will have a production capacity of 3 to 5 tons of finished product per day, effectively tripling their current output. This investment will allow USAID to give a new impetus to the cultivation of small industry in Mali based on the promotion of local products, with particular attention to the millet, sorghum and rice value chains.

Following this new loan the company continues to search for ways to diversify its funding sources with various banking partners, which is reflected in the updated business plan for Danaya Cereals. A more productive enterprise like Danaya boosts demand, so farmers can grow and sell more of their surplus. With more revenue, female farmers can reinvest in their businesses and most importantly, their family's futures.

Support to lowland rice producers in Sikasso

In the Sikasso region, rice is grown in rain-irrigated lowlands, and cultivated by 95% women. These rice producers are an important resource for rural development in the region, a major reason why IICEM has targeted them for support since project inception. These farmers were confronted by numerous challenges, including lack of experience in improved production techniques, which resulted in poor harvests. Low literacy meant these farmers were losing an estimated 10% of profits through their inability to read scales or documents provided during sales. These knowledge gaps were compounded by a poorly structured market system where quality was inconsistent, and overall sales occurred in small quantities or not at all.

IICEM focused on each of these distinct problems to boost empowerment for targeted female groups, and helped them gain control of their production, processing and crop sales. The

Above: This literacy training in the Sikasso region is part of a series of sessions held for partner farmers. Literacy enables women not only read and write in their own language, but also helps them leverage new production technologies, increase their market access and negotiate better prices for their crops. IICEM trained more than 2,000 participants in literacy in FY2013 alone; more than 80% of women were evaluated as functionally literate after participating.

project helped finance construction of 29 small irrigation dams to expand lowland rice cultivation, helping more than 20,000 beneficiaries raise yields and household revenues.

IICEM also partnered with eight new women's cooperatives to build warehouses that facilitate storage and commercialization of their crops and heighten overall quality. Six cooperatives also received rice hulling machines, adding value to existing crop sales through new products like milled white and parboiled rice, which can increase profits by more than 30%. Rice hulling machines are managed by a committee established by beneficiary groups and function with a service fee of 750 FCFA ($1.57)/100 kg of paddy. As a foundation for this assistance, IICEM worked closely with women's cooperatives to support and train members in business management, accounting, entrepreneurship, literacy and agricultural best practices.

CONCLUSION: LESSONS AND RECOMMENDATIONS

Left: IICEM's lessons-learned workshop spanned two days at the end of the project, bringing together a group of stakeholders that included partner farmers, NGO representatives, and government officials. IICEM's market-driven strategy meant that private sector businesses were engaged equally, including banking representatives, cereal wholesalers and processors from target regions.

The Feed the Future initiative "strives to increase agricultural production and the incomes of both men and women in rural areas who rely on agriculture for their livelihoods," with a strong focus on both food-insecure geographic regions and staple crop value chains. In early 2011, USAID/Mali began aligning the IICEM project with Feed the Future, which ultimately led to a focus on two value chains, millet/sorghum and rice, as well as on the more vulnerable communes in Mali. IICEM team met the challenge of transforming a core group of nearly 40,000 vulnerable, largely subsistence smallholders into commercial farmers of staple food commodities by helping them gain access to a technology package (improved seeds, fertilizer, and irrigation infrastructure) for greater production, market linkages for new surpluses, and credit for investment. The linchpin to all this was the introduction of the system of contractualization.

The underlying premise of USAID/Mali's approach was that linking farmers to higher-value, higher-volume markets for these commodities would spur adoption of the techniques and technologies to enable them to boost productivity per hectare. Yet IICEM worked on several fronts simultaneously to ensure this outcome: IICEM's farmers needed to reimburse the bank credit they received (a first for many of them) and had a new mechanism to obtain that credit— pre-contracted sales to traders and processors—enabling them to adopt the new technology package, which raised yields by 40-100 percent, depending on the crop. Indeed, the

vast majority of the contracted sales made by IICEM-assisted farmers consisted of just the quantity of sales necessary to reimburse the credit taken by the producer organization.

If IICEM's approach is to be scaled up to benefit millions of Malian farmers, USAID would do well to consider the following issues and questions:

1. Altogether, Mali's largest institutional buyers—the WFP and Moulins de Sahel—plus emerging buyers like Danaya Cereals have purchasing capacity for a maximum 5 percent of Mali's millet/sorghum production. What is their realistic, potential demand, and is it significant enough to spur broad adoption of agricultural technologies amongst the majority of Mali's millet/sorghum farmers? Should future projects emphasize systems that increase the knowledge of, physical access to and credit for investment in the technology package as opposed spending resources building this institutional buyer market that may always be a small part of total Malian millet/sorghum production? Is the scenario for the rice value chain altogether different?
2. Besides formal market transactions, what are other desirable outcomes of USAID/Mali assistance in agriculture and economic growth? Greater productivity leads to food security, of course, but could also lead to crop diversification, better family nutrition, and time for non-farm employment if farmers are able to increase per-hectare productivity to grow enough to feed their families and have land and time to spare.

Whatever the answers going forward, the IICEM project has set the stage by showing that, in Mali, farmers can adopt new technologies to substantially increase their on-farm yields, traders and farmers can formalize age-old ways of doing business, and bankers can make loans to those growing rain-fed crops. In so doing, IICEM established several precedents.

In October 2013, IICEM held an end-of-project lessons learned workshop in Bamako for its staff and stakeholders, who produced the following lessons and recommendations for each of the project's areas of emphasis.

Production and Productivity

IICEM's irrigation infrastructure provided significant gains in productivity for partner farmers by opening up new lands for cultivation and increasing their crop yields. Yet adoption of new project-promoted technologies is still hampered by barriers, including lack of land tenure and limited awareness of the benefits of new technologies in many communities.

IICEM specialists and stakeholders made the following recommendations:

- Integrate land tenure mediation and formalization into cooperative support plans.
- Promote use of new technologies through farming clusters led by agriculture community leaders and supported by site visits, a communications strategy and reinforcement from agricultural extension services.
- Further professionalize farming organizations by helping them find niche markets and products that add value to their existing production.
- Management tools and close support were found to be critical for cooperative leaders and must also be included in future projects to support overall cooperative governance.

Additionally, IICEM specialists would like to offer the following thoughts on improved seed distribution, which was one of the keys to the project's success. Without further action, this technology will not spread, and the cycle of poor crop productivity and low household revenue will continue. To ensure increased use of improved seeds, viable commercial demand and continuing development of national seed markets, producer organizations must first assess and understand the impact of improved varieties. Then the availability and quality of improved seeds must be guaranteed and value-added commercial grain markets must continue to grow to ensure profitability. Future projects, alongside Mali's Ministry of Agriculture, should continue the foundation laid by IICEM through better coordination of large-scale demonstrations. A multi-year, coordinated demonstration plan, comprising all donors and research institutes, should be developed and executed. With more than 2.5 million acres of millet/sorghum crops in Mali, a centrally coordinated effort is the only way to facilitate technology adoption at a scale necessary for improved seeds to gain real momentum.

To move Mali towards a private sector-driven seed market, IICEM makes the following recommendations:

- Well-run demonstration plots and behavior change communication are keys for improving farmer demand.
- Establishing a viable distribution network, either through local agro-dealers and/or establishing 'input boutiques' within producer organizations will help improve the last-mile distribution.
- These distribution points should be linked with the seed multipliers. Advanced contracts should govern the transactions between them and should be used for the solicitation of credit from the banks; similar to what IICEM has instituted in the grain output sector.
- The IER should focus on producing sufficient foundation seed to meet the demand from the seed multipliers. The IER should focus on developing the right varieties based on true farmer preferences (not only drought tolerance), which includes yield, but also post-harvest handling, taste, texture and cooking characteristics.
- Decentralization of the seed certification process, through regional laboratories with control teams to lower costs and increase availability of services. Security and enforcement measures must also be put in place to ensure the integrity of certified seeds through a numbered bag system that includes viability testing every two months and official documentation.
- Finally, the public sector (donors and the GOM) should avoid distributing seeds for free and/or acting as the intermediary between seed multipliers and farmers. These market distorting practices have significantly elevated the price of certified seed above what farmers are willing to pay.

Access to Markets

To strengthen and grow Mali's cereal markets, IICEM promoted a three-pillar strategy:

1. Quality assurance—higher-quality products that meet standards set by industry players and buyers are more attractive in regional markets.

2. Improved logistics platform—warehousing and grouped sales strategy enabled scaling-up of all sales.
3. Contracting process–purchase contracts solidified new business relationships and gave a guarantee of income to cooperatives, enabling them to better manage their revenue.

Most of the lessons learned in the application of IICEM's market access strategy took place in the contracting and quality assurance processes, which were behavior-change processes.

IICEM specialists and stakeholders made the following observations and recommendations:

- Contract terms were clearly outlined with the help of IICEM staff, but given that the contracting process is a new practice, cooperatives still had problems with compliance and overall understanding of the terms of contracts. A combination of close agricultural and business development support is necessary to ensure that cooperatives follow the market-driven requirements in their contracts.
- The concept of quality still varies between producer organizations, as do the resulting premiums. A set of national standards would assist this, formed in conjunction with the cereals advocacy committee, which would further help spread awareness of quality standards to key value chain players. To reinforce farmers' adoption and comprehension of these practices, quality should be emphasized in warehousing strategies as part of an integrated commercialization process.
- The presence of a sales contract did not always guarantee bank loans, especially for wholesale traders. To bolster access to finance for all value chain players, a continued track-record of good bookkeeping and cooperative management is needed to earn the trust of lending institutions, beyond formally contractualized sales agreements.
- The pricing of cereals at the cooperative level is often driven by the needs of cooperative members and does not always reflect an accurate understanding of the current market environment. Continued building of trust-based relationships would help to regulate pricing issues where cooperatives often seek to obtain the same price for cereals as the year before, regardless of the current market environment.
- At the processing level, semi-industrial rice mills and millet/sorghum processors continue to need support in order to grow capacity and on-farm demand. More business development services are necessary to guide growth and most importantly, diversify sources of financing. New sales contracts have not yet been leveraged to secure funding. Loans are critical to help businesses secure new land and equipment and support regional cereal industries.
- At the demand level, the need for raw materials for cereal processors needs to be better structured and communicated to producers by promoting collaborative relationships among actors that goes beyond just a simple contract. Sales contracts act as catalysts, but continued support is necessary to ensure this process grows into the development of strong business relationships.

Reducing Trade Barriers

Reducing trade constraints in Mali will rely on value chains made stronger through business development assistance, access to finance, and the extension of the contracting process to all stakeholders. As these market players grow in capacity and influence, they will lend power to advocacy efforts to change the status quo and disrupt old practices that have inhibited Mali's international cereal trade for decades. Two main themes emerge in recommendations to reduce trade barriers, the first being the importance of adherence to regional trade standards, and the second the importance of advocacy to promote education of stakeholder groups about their rights and encourage open dialogue with the Government of Mali about the interests of cereal value chain stakeholders.

IICEM specialists and stakeholders made the following recommendations to achieve these two goals:

- Introduce a system at the level of the Ministry of Commerce to monitor commitments made by Mali at the WAEMU, ECOWAS and WTO as well as the movement of cereals and price trends, to provide better enforcement and guidance for decision-makers.
- Simplify legal procedures for registering as a cereals exporter to better facilitate trade and commerce in rural areas, as has already been achieved for the export of livestock.
- Develop a training program for customs officials, agricultural (including phytosanitary) and veterinary services, freight forwarders, traders and carriers to educate them about procedures for the free trade of cereals between all WAEMU and ECOWAS countries.
- Continue the policy of setting up representative bodies across the cereals sector and improving the ability of stakeholders in cereals sector value chains to act as advocates.

Access to Finance

In Mali, most farmers are illiterate, making basic financial concepts like working capital, equity, earnings statements and profit difficult to explain and the adoption of related best-practices even more challenging. Borrowers are often poorly equipped to manage their own cooperatives or present basic bookkeeping records to show earnings and expenses.

To mitigate these risks and build greater capacity, a system of individualized technical support is necessary. IICEM's strategy assigned one field agent to a geographical area covering between 15-20 villages, with two total agents for a selected area, each with a specialization in agriculture or finance/business development services. By focusing on opening the flow of credit and more commercial structures, the project was able to achieve a tangible success in millet/sorghum financing. Continuation of the business relationships forged by the project will depend on further investment and management at every level of the value chain—as well as on actual repayment of outstanding loans, especially those made with full risk by the bank in 2013.

Continued growth in technical, organizational and financial capacity is necessary to ensure Mali's farming cooperatives keep the confidence of financial institutions and receive incentives for market development.

IICEM specialists and stakeholders made the following specific recommendations:

- Continue monitoring of market and repayment of outstanding loans.

- Enhance technical, organizational and management capacity of producer organizations.
- Support relationships between producer organizations regarding credit, from the initial application process, through repayment.
- Encourage private investment in the agricultural sector.
- Identify and link partner farming cooperatives with agro-enterprises related to processing and marketing to drive new financing.

Environmental Resilience

Through IICEM's efforts to build resilience to climate shocks, nearly all project intervention project sites could have established contour bunds, known technically as *aménagement en courbe de niveau* or ACN in French. Yet the potential to scale up this technology relies primarily on the dissemination methods used to gain adoption in target communities. Although the total number of hectares with ACN exceeded the project goal by more than 20%, implementation was uneven regionally, with the majority of activity in the Koutiala area. This was mostly due to scarce mobilization of partner producers for trainings and site surveys (staking) of their fields. Many producers were not adequately informed of the training opportunity so attendance was poor, and some trainings started after the agricultural season had begun, which meant that producers were not able to put what they learned into practice for the 2013-2014 season. Some regions also proved more suited to this technology than others. Bougouni, for example, has lower land density, so farmers frequently change their field locations, making it difficult to design erosion control systems in areas that may not be used during the next season.

IICEM specialists and stakeholders made the following observations and recommendations:

- ACN was introduced relatively late in the project, resulting in a significant difference between various regions, depending on their familiarity with the technique and the timing of regional dissemination. Future projects should incorporate this technique at project inception for maximum technology uptake.
- Millet and sorghum is the target value chain of Feed the Future/IICEM, but many producers, especially in the Sikasso region, prefer to grow corn or other crops in addition to millet and sorghum, which imposed significant limitations on which how many producers participated in ACN implementation.
- Some cooperatives were unable to closely monitor implementation on their fields. For proper implementation, contour lines need to be staked and monitored closely. Future projects should reuse demonstration sites and trainers to maintain the knowledge accumulated during this process.
- Future projects should employ a communications or social marketing strategy to promote adoption of this practice, plus intra-regional site visits, backed by concrete data that demonstrates increases in yields. Although many farmers realized significant gains after implementing ACN, the benefits remained relatively unknown among target communities because of implementation scale and lack of information-sharing.